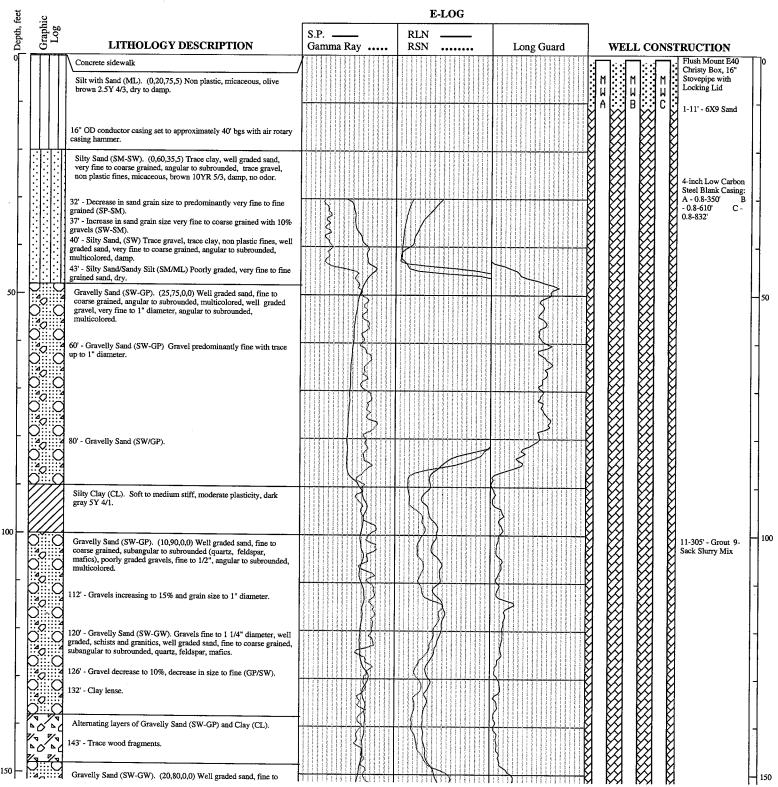
Project: Muscoy RA Location: San Bernardino, CA Project Number: 18600069.06010		Log of Monitoring Wells: MW-135A, MW-135B, MW-135C	
Dates Drilled: 4/17/02 - 4/23/02	Total Depth Drilled: 880 feet	Logged By: M	.Hogaboom, P.Crispell
Drilling Contractor: Water Development Corp	Borehole Diameter: 14 1/2-inch	Checked By: I	OLB
Drill Rig Type Dresser T 70 W	Well Construction Dates: 4/24/02 - 4/	6/02 Screen Slot Siz	e: 0.020-inch
Drilling Method: Reverse Circulation Mud Rotary	Well Diameter: 4-inch		
Drill Bit: 10 5/8 and 14 1/2-inch Mill Bit	Well Casing: Low Carbon and Stainless	Steel	
Comments:			
icet C	I	-LOG	
ppth, fee	S.P. RLN		



Project: Muscoy RA **Log of Monitoring Wells:** MW-135A, MW-135B, MW-135C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG Graphic Log S.P. RLN LITHOLOGY DESCRIPTION Gamma Ray RSN Long Guard WELL CONSTRUCTION coarse grained, salt and pepper, quartz, mafics, trace feldspars, subangular to subrounded, well graded gravel, angular to subangular to 1.5". 157' - Wood fragments. **4**0 160' - Continue gravelly sand. Silty Clay (CL). Trace sand, soft, low to moderate plasticity, olive brown 2.5Y 4/3. 185' - Color change to dark gray 2.5Y 4/1. Sand (SW). Well graded sand with trace fine gravel (5,95,0,0), fine to coarse grained, subangular to subrounded, quartz, feldspar, mafics, schists. 200 Silty Sand/Sandy Silt (SM-ML). Fine to coarse grained sand with fines, trace gravel, salt and pepper, Silty Clay (CL). Medium stiff, low to moderate plasticity, micaceous, dark gray 2.5Y 4/1. Gravelly Sand (SW-GP). (10,90,0,0) Well graded sand with fine gravels. At 243' - Decrease in gravel size to fine and amount to 10%. 220' - Gravelly Sand (GW/SW) Well graded sand, angular to subrounded, fine to coarse grained, quartz, feldspar, mafics, gravels fine to 1", angular to subrounded, schists, granitics. Difficult drilling, much rig chatter. 227' - Decrease in gravels to trace fine grained, increase in fines. 230' - 3' clay layer, dark gray, grading back to a sand with fines, trace 240' - Gravelly Sand (SW/GP) Well graded sand, angular to subrounded, fine to coarse grained, quartz, feldspar, mafics, gravels fine to >1", angular to subrounded, schists, granitics. Alternating layers of SW/GP and CL dark gray. 6 × × × 250 0 00 Z Gravelly Sand (SW-GW). (15,85,0,0) Well graded sand, fine to coarse grained, subangular to subrounded, quartz, feldspar, mafics, volcanics, gravels well graded, fine to 1", schists, multicolored. 280' - Gravelly Sand (SW/GP) Gravel up to 1 1/2". 293' - Decrease in gravel to 5% and size to <1/2", increase fines Silty Sand/Sandy Silt (SM-ML). Grading into a Silty Sand with 300' - Silty Sand/Sandy Silt (SM-ML). Poorly graded, fine to coarse 300 predominantly medium grained. Not much return on shaker. Sand (SP-SM). Poorly graded, predominantly medium grained, trace fine and coarse grains. 315' - Increase in grain size to trace fine gravel and increase in fines. 305-332' 1:1 Bentonite - Sand

Seal

300

Gravelly Sand (SW-GW). (15,85,0,0) Well graded sand, fine to coarse grained, angular to subrounded, quartz, feldspars, mafics. Gravels fine to 1" diameter, angular to subrounded, schists, quartz,

and granitics.

330' - Rig chatter - cobbles.

Project: Muscoy RA Log of Monitoring Wells: MW-135A, MW-135B, MW-135C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG Graphic Log S.P. RLN LITHOLOGY DESCRIPTION Gamma Ray RSN Long Guard WELL CONSTRUCTION 336' - Decrease in gravels to 10% (GP), finer grained. 332-350 Transition 340' - Gravelly Sand (SW/GP) as at 320'. Sand (#60) Bridge Silty Clay (CL). Stiff, moderately plastic, dark gray 5Y 4/1. 350 350 4-inch Stainless Steel Blank Casing with Di-electric Coupler 350-360' 360° - Silty Clay (CL). Soft - medium stiff, low plasticity, dark grayish brown 2.5Y 4/2. 360-380' 4-inch 364' - Sand lense. Stainless Steel, .020-inch Slot Continuous Wire 370' - Decrease in clay, increase in fines. Wrap Screen, Filter Pack #3 Sand 350-400' 375' - Increase in clays. Gravelly Sand (SW-GW). (25,75,0,0) Well graded sand, fine to coarse grained, subangular to subrounded, quartz, feldspars mafics. Gravels fine to 1 1/2" diameter, angular to subrounded. 390' - Rig Chatter - cobbles. 400 400' - Gravelly Sand (SW-GW). Well graded sand, fine to coarse 400 grained, subangular to subrounded, quartz, feldspars, mafics. Gravels fine to 1 1/2" diameter, angular to subrounded. 415' - Decreasing gravels to 5-10%, fine gravel (GP-SW). 420' - Gravelly Sand (SW-GW). 422' - Decrease gravels to 15%. 430' - Increase in fines. 433' - Increase in gravels to 20-25%. 435' - Decrease in gravels & sands, increase fines Clay (CL). Soft, moderate plasticity, micaceous, dark gray 2.5Y 4/1 interbedded with Sands (SW) 437-453'. 450 450 450' - Color change in clay to dark grayish brown Gravelly Sand (SW-GW). (15,85,0,0) Well graded sand and gravel, subangular to subrounded sand, fine to coarse grained, gravel angular to subrounded, predominantly fine with 5% coarse, multicolored. 460' - Gravelly Sand (SW-GW). 465' - Decrease in gravels to 15%. Much rig chatter. 470' - Difficult drilling - cobbles. 400-573' - Grout 9-Sack Slurry Mix Alternating layers Gravelly Sands and Clay. Clay - soft, low to moderate plasticity, micaceous, olive brown 2.5Y 4/3. 492' - Increased fines, transitioning into clay (ML-CL). 497' - Increasing coarse sands and gravels (SP). 500 500' - Gravelly Sand (GW-SW). Transitioning into a clayey silty 500 sandy gravel. Continue alternating layers. 510' - Increase in fines (ML). 512' - Beginning to coarsen to sands and gravels (SW-GP). Sacramento, CA 95833 916-679-2000

Project: Muscoy RA **Log of Monitoring Wells:** MW-135A, MW-135B, MW-135C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG Graphic Log S.P. RLN Gamma Ray LITHOLOGY DESCRIPTION RSN Long Guard WELL CONSTRUCTION 518 - Increase in fines/clays (ML-CL).
Sand (SW) with trace gravel grading to a well graded Gravelly
Sand (SW-GW). (35,65,00) Fine to coarse grained, gravel fine to
1", angular to subrounded, multicolored. 526 - Decrease gravels to 15%, increase fines. Clayey Silt/Silty Clay (ML-CL). Soft, moderately plastic, 30% silt, 70% clay, micaceous, brown 10YR 4/3. 533' - Begin to coarsen to sands (SM). Transition back to ML-CL. 540' - Clayey Silt/Silty Clay wtih trace sand. 548' - Begins to coarsen, 15% sands. 550 550 553' - Less clays to trace, sandy silt (ML). 555' - Clay lense. 560° - Sandy Silt/Silty Sand with Clay (SM/ML), Well graded sand, angular to subrounded, fine to coarse grained. Silty Clay (CL). Soft, low plastic, light olive brown 2.5Y 5/4. Color change to very dark gray 10YR 3/1, medium stiff.
Alternating layers predominantly Silty Clay 565-588;
570 - Sand lense and clay color change to light olive brown. 575' - Sand lense and clay color change back to very dark gray. 578' - Clay color change to gray 2.5Y 5/1. 580' - Silty Clay (CL). Medium stiff, moderately plastic, dark gray 573-592' - 1:1 2.5Y 4/1 with white mottling. Bentonite - Sand 585' - Color change to dark grayish brown 2.5Y 4/2. Decreasing clays, coarsening toward sands Gravelly Sand (SW-GP). (15,85,0,0) Well graded sand, fine to ocarse grained, angular to subrounded, quartz, feldspar, mafics. Gravel fine to 1/2", increasing to 20% with depth (20,80,0,0) angular to subrounded, multicolored.

596 - Clay lense with increasing fines, decreasing gravels to trace. 592-609' Transition Sand (#60) Bridge 600 600 Silty Clay (CL). Medium stiff, moderately plastic, brown 10YR 613' - Increase in fines coarsening to well graded sand with trace fine 4-inch Stainless Steel Blank Casing with Di-electric Silty Sand/Sandy Silt (SM-ML). Well graded sand, fine to coarse Coupler 610-620' grain with trace fine gravels, angular to subrounded, silt balls, nonplastic fines, pale brown 10YR 6/3. 620-640' 4-inch Stainless Steel. .020-inch Slot Continuous Wire 630' - Sands and gravels increasing 5-10%. Wrap Screen, Filter **.**0 Pack #3 Sand 609-Gravels fine to 1/2" increasing to 10-15%, decrease in fines. 640' - Gravelly Sand (SW-GP). Well graded sand, fine to coarse grained, angular to subrounded, quartz, feldspars, mafics, gravels fine to 10° , angular to subangular, multicolor. 647^{\prime} - Increase in fines, decrease gravels to 5-10%. Rig chatter. 650 Silty Clay (CL). Stiff, trace medium sand, moderately plastic, brown 10YR 5/3. 656' - Decrease clay balls, increase fines coarsening to sand. Gravelly Sand (SW-GP). (15,85,0,0) Well graded sand, fine to coarse grained, angular to subrounded, quartz, feldspars, mafics, gravels fine to .5", angular to subangular, multicolor. 666' - Increasing fines. 671'-675' - Clayey Sandy Silts/Silty Sandy Clays or small alternating 675' - Coarsening back to gravelly sand (SW-GP).

650

Silty Sand/Sandy Silt (SM-ML). Well graded sand with trace gravel (5,45,50,0), fine to coarse grained, angular to subrounded. multicolored. Silt balls - nonplastic fines with trace clay, light olive

Silty Clay (CL). Soft to medium stiff, moderately plastic,

micaceous, gravish brown 2.5Y 5/2 698' - Decrease in clays, fines increase and coarsen.

brown 2.5Y 5/3.

Project: Muscoy RA Log of Monitoring Wells: MW-135A, MW-135B, MW-135C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG Graphic Log S.P. RLN LITHOLOGY DESCRIPTION Gamma Ray RSN Long Guard WELL CONSTRUCTION 655-790' - Grout 9-Silty Sand/Sandy Silt (SM-ML). Trace gravel (5,40,55,0) Well graded sand, angular to subrounded, fine to coarse grained, fine Sack Slurry Mix gravels angular to subrounded. 711' - Increase in fines with trace clay balls. Decrease in sands to trace fine, increase clay 15-20% (ML-CL). 715' - Seds coarsening to silty sand/sandy silt, trace clay. 717' - Increase fines, decrease sand, clays to 10%. Silty Clay/Clayey Silt (CL-ML). Soft, low to moderate plasticity, micaceous, light olive brown 2.5Y 5/3. 730' - Increase clay, color change to dark gray 2.5Y 4/1. 732' - Decrease clay, increase fines and coarsening toward sand lense. Increase clay, light olive brown. 740' - Silty Clay/Clayey Silt (CL-ML). Soft, low to moderate plasticity, micaceous, light olive brown 2.5Y 5/3. 742' - Decrease clay, grading into a silty sand/sandy silt (SM-ML) Silty Sand/Sandy Silt (SM-ML). Poorly graded sand, fine to coarse, predominantly medium grained, subangular to subrounded, quartz, feldspar, mafics, multicolor. 752' - Grading to SW with fine gravels to 1/2". 750 754' - Decrease grain size/amount sand, increase fines. Much rig chatter, brought up pieces of broken schist >1". 760' - Silty Sand/Sandy Silt with gravel (SM/ML) Well graded sand, fine to coarse grained, angular to subrounded, quartz, feldspar, mafics, gravels fine to 1/2". Slow drilling - cemented. Gravelly Sand (SW-GP). (15,85,0,0) Well graded sand, fine to coarse grained, angular to subrounded, gravels predominantly fine with trace coarse to 1". Much rig chatter - cobbles. 775' - Increase fines, decrease in gravels to trace, drilling smoothed. Small clay lense. 40 780' - Gravelly Sand (SW-GP). Well graded sand, fine to coarse grained, angular to subrounded, gravels predominantly fine with trace coarse to 1". 790' - Increase fines. Rig chatter, decrease gravels to 5%. 797' - Decrease fines, increase gravels to 15%. 800' - Gravelly Sand (SW-GW). Well graded sand, fine to coarse 800 grained, angular to subrounded, quartz, feldspar, mafics, multicolor, gravels fine to 1", angular to subangular, schists, granitics. 790-822' - 1:1 Bentonite -Sand 806' - Increase fines, decrease gravels and sands, clayey silt balls 806 - Increase mices, usarease praves and oct-ML). Soft, low plastic, micaceous, brown 10YR 5/3. Coarsening back to SW with fine Seal gravels. Interbedded. Alternating layers Silty Clays/Gravelly Sands 817'-840' 6 822-845' Transition Sand (#60) Bridge 825' - Coarsening to SW-GP - continue interbedded silty clays/gravelly sands. 000 4-inch Stainless Steel Blank Casing Silty Sand/Sandy Silt with Clay (SM-ML). Trace gravel, (5,40,40,15), silty clays, low plastic, soft, brown 10YR 5/3, well with Di-electric <u>Z</u>y Coupler 832-842' graded sands, fine to coarse grained, angular to subrounded, gravels 842-862' 4-inch Increase clay, decrease sand with no gravel. Stainless Steel, .020-inch Slot 850 Continuous Wire 850 Wrap Screen, Filter 852' - Decrease clays to trace (ML). Pack #3 Sand 845-855' - Increase sands, fine gravel to Sandy Silt (ML). Clay lense. 862 Silty Sand/Sandy Silt (SM-ML). Trace clay, 10% fine gravel. Fines soft, non to low plastic, light olive brown 2.5Y 5/3, (10,35,45,10), well graded sand, fine gravel, angular to subrounded. Screen damaged, total depth - 858.5'. 865' - No clays, increase sand to 45%. Rig chatter. Gravelly Sand (SW-GW). Well graded sand, fine to coarse

800

grained, angular to subrounded, quartz, feldspar, mafics, gravels fine to 1". Much rig chatter.

At 880' - Gravelly Sand (SW/GP).

862-880' Natural Fill.